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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,549	01/27/2004	Zahi M. Kurzum	FIS920030418US1	3089

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EXAMINER	
DOAN, NGHIA M	
ART UNIT	**PAPER NUMBER**
2825	

DATE MAILED: 11/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/766,549	KURZUM ET AL.
	Examiner	**Art Unit**
	Nghia M. Doan	2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 27 January 2004.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-20 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 27 January 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. Responsive to communication application 10/755,549 filed on 01/27/2004, claims 1-20 are pending.

Information Disclosure Statement

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Oath/Declaration

3. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because: the second inventor has not been signed.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 15 recites the limitation "global network model" in line 2. There is insufficient antecedent basis for this limitation in the claim.

6. For examination purpose, Examiner reads the phrase "global network model" as "network flow model".

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. **Claims 1 and 20 are rejected under 35 U.S.C. 102(b) as being Chang et al. (Change) by (US 6,415,426).**

9. **With respect to claims 1 and 20**, Chang discloses a method and computer system for resolving (removing) cell placement overlap in an integrated circuit (Chang, abstract) comprising the step of:

a) determining an initial placement of the cells (Chang, col. 18, ll. 13-20).

b) capturing the placement-view including blockage-space and free-space to define in an image space physical regions of the integrated circuit (Chang, col. 18, ll. 33-37, -- a search window includes blockage and free space because determines where cells may be placed – and fig. 7, col. 20, ll. 14-29, target zones and candidate zones)

c) constructing a network flow model representing the movement of the cells between the physical regions (Chang, col. 18, ll. 50-53 and col. 21, ll. 57-63, -- target zone in the search window—and col. 16, ll. 21-43, -- quadratic placement and graph model --);

d) solving the network flow model to determine a desired flow of the cells between the physical regions of the integrated circuit (Chang, col. 18, ll. 50-53 and col. 21, ll. 35-56, -- evaluate cell movement --); and

e) realizing the best approximation of the desired flow of cells (Chang, col. 18, ll. 50-53, col. 21, ll. 35-56, and col. 22, ll. 35-45, finding the best legal moves).

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. **Claims 1-5 and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Donelly et al. (US 6,948,14).**

12. **With respect to claims 1 and 20**, Donelly discloses a method and computer system for resolving (removing) cell placement overlap in an integrated circuit (Donelly, abstract) comprising the step of:

a) determining an initial placement of the cells (Donelly, fig. 1 and fig 2A, step 220, and col.6, ll. 65-67 and col. 4, ll. 14-26).

b) capturing the placement-view including blockage-space (fixed space) and free-space (empty space) to define in an image space physical regions of the integrated circuit (Donelly, fig. 1, col.4, ll. 14-57, and col. 6, ll. 49-58);

c) constructing a network flow model (-- construct direct acyclic graph for each linear dimension --) representing the movement of the cells between the physical regions (Donelly, col. 4, ll. 33-41);

d) solving the network flow model to determine a desired flow of the cells between the physical regions of the integrated circuit (Donelly, col.4, ll. 26-32 and ll. 42-64); and

e) realizing the best approximation of the desired flow of cells (Donelly, col. 5, ll. 20-67, finding the best legal moves).

13. **With respective to claim 2**, Donelly discloses the method as recited in claim 1, wherein in step b) the physical regions defined in the image space capture a two-dimensional distribution of the free-space (empty space), blockage space (fixed space) and placement of the cells (Donelly, fig. 1, col. 3, ll. 65-67, col. 4, l. 58-67, col. 5, ll. 1-24, and col. 6, ll. 49-58).

14. **With respective to claim 3**, Donelly discloses the method as recited in claim 1, wherein in step b) the physical regions defined in the image space are placement-aware to facilitate physically realizable global solutions (-- super cell in its entirely is optimally placed --) and avoid unnecessary movement of the cells across the physical regions (Donelly, fig. 3, col. 7, ll. 3-7, 39-67 and col. 8, ll. 20).

15. **With respective to claim 4**, Donelly discloses the method as recited in claim 1, wherein in step c) the network flow model represents a required global area migration across the image space to satisfy area capacity-demand constraints (Donelly, col.4, ll. 51-67 and col.5, ll. 32-43).

16. **With respective to claim 5**, Donelly discloses the method as recited in claim 1, wherein in step c) the network flow model captures a two-dimensional movement of the cells between the physical regions (Donelly, col. 4, ll. 42-53).

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. **Claims 6-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Donelly et al. (US 6,948,14) in view of Dasasathyan et al. (US 6,857,115).**

19. **With respective to claim 6**, Donelly discloses the method as recited in claim 1, wherein step e) further comprises the steps of:

selecting the cells from each physical region to satisfy the desired flows in each direction with minimum displacement constraint (Donelly, fig. 2, step 290 and col. 4, 26-32, and ll. 51-57). physically moving the cells between the physical regions (Donelly, col. 4, ll. 42-53); and

Donelly does not specifically disclose the desired flow is satisfied with minimum cost and updating the desired flows locally based on an unrealized flow value.

Dasasathyan does disclose the desired (-- feasible --) flow is satisfied with minimum cost (Dasasathyan, col. 4, ll. 27-34 and ll. 41-48).

Dasasathyan also discloses updating the desired flows locally based on an unrealized flow value (Dasasathyan, col. 4, ll. 48-52, and fig. 18, steps 550-560, col. 10, ll. 10-59, which is a loop updating desired flow for the network if any conflicted movement of the flow--).

It would have been obvious to one of ordinary skill in the art to combine Donelly and Dasasathyan references for implementing a method of resolving overlapping placement with maximum network flow technique as minimum cost (Dasasathyan, col. 4, ll. 41-48) associated with minimum displacement (wirelength) movement from the initial placement (Donelly, col. 4, ll. 26-32 and 42-53). Moreover, the only way to achieve the maximum network flow technique as minimum cost solution that the capacity and location of cell placement must be taken into account. Therefore, the desired network flow also keeps updating and computing for the next iteration (Dasasathyan, col. 4, ll. 50-57 and col. 5, ll.1-7).

20. **With respective to claim 7**, Donelly and Dasasathyan disclose the method as recited in claim 6, wherein in step e1) the selection of cells from each physical region is modeled as a generalized network flow model (Donelly, col. 5, ll. 32-43).

21. **With respective to claim 8**, Donelly and Dasasathyan disclose the method as recited in claim 6, wherein in step e1) the cells to be moved from one physical region to all neighboring regions based on the desired flow directions (-- horizontal direction --) are selected simultaneously to minimize the total cost (--minimum displacement--) (Donelly, col. 4, ll. 51-67, col. 5, ll. 1-18 and ll.44-65).

22. **With respective to claim 9**, Donelly and Dasasathyan disclose the method as recited in claim 6, wherein in step e1) an approximation algorithm is provided for

selecting the cells from one physical region to be moved with minimum cost (--minimum displacement--) (Donelly, col. 6, ll. 49-67 and col. 7, ll. 1-10).

23. **With respective to claim 10**, Donelly and Dasasathyan disclose the method as recited in claim 6, wherein in step e1) the cost of the cell movements is computed by executing a method selected from the group consisting of: quadratic movement cost (--quadratic programming--) (Donelly, col. 6, ll. 15-40), linear movement cost (Donelly, col. 5, ll. 66-67 and col. 6, ll. 15), linear wirelength change (--minimum displacement --) (Donelly, col. 4, ll. 26-32).

24. **With respective to claim 11**, Donelly and Dasasathyan disclose the method as recited in claim 6, wherein in step e2) the cells are moved to target regions (-- the energy spring system is zero--) while determining a detailed physical location of the cells that are moved (Donelly, col. 8, ll. 1-12).

25. **With respective to claim 12**, Donelly and Dasasathyan disclose the method as recited in claim 11, wherein the cells are placed at the closest physical location in the target region from the original region using ripple-slide operation to resolve local overlaps resulting thereof (Donelly, fig. 1, col. 4, ll. 58-67 and col. 5, ll. 1-30).

26. **With respective to claim 13**, Donelly and Dasasathyan disclose the method as recited in claim 6, wherein in step e2) the regions are dynamically resized to accommodate the horizontal movement of the cells (Donelly, col. 7, ll. 1-17, -- super cell may comprise two or more original constituent cell and partition in two or more part--).

27. **With respective to claim 14**, Donelly and Dasasathyan disclose the method as recited in claim 6, wherein in step e3) the desired flows from the target regions are locally updated to account for excess assignments resulting from discrete cell sizes

(Donelly, col. 7, ll. 18-38, -- if a cell not a super cell, then the process resumes to step to select the super cell and terminal process if queues empty--) and (Dasasathyan, col. 7, ll. 17-30).

28. **With respective to claim 15**, Donelly discloses the method as recited in claim 1, further comprising the steps of: updating (resuming) the global network model by iterating steps (d) and (e) to converge to a solution that satisfies all capacity-demand constraints (Donelly, col. 5, ll. 32-43, and col. 7, ll. 18-35); providing a local re-ordering of the cells to minimize a linear wirelength metric (Donelly, col. 5, ll. 38-65); and

Donelly does not specifically disclose the movement of multi-row high cells using an augmented network flow model.

Dasasathyan discloses the movement of multi-row high cells using an augmented network flow model (Dasasathyan, figure 7, 9, 12 and 16-17 and see the descriptions).

It would have been obvious to one of ordinary skill in the art to combine Donelly and Dasasathyan references for implementing a network flow model as either methods ripple-slide cell (Donelly, fig. 1, col. 4, ll. 58-67 and col. 5, ll. 1-30) and multi-row high cells (figure 7, 9, 12 and 16-17 and see the descriptions) movement for achieved a minimum displacement (wirelength) (Donelly, col. 5, ll. 32-43) and maximum network flow technique with minimum cost (Dasasathyan, col. 4, ll. 41-48), that provides efficiency technique to resolve overlap cell placement and optimization constraint problem (Donelly, col. 1, ll. 9-13 and Dasasathyan, col. 1, ll. 6-8).

29. **With respective to claim 16**, Donelly and Dasasathyan disclose the method as recited in claim 15, wherein in step g) the new position of the cells is achieved by

swapping cells within a local region to minimize the linear wirelength (Dasasathyan, figure 7A-7B, and col. 5, ll. 50-65 and col. 8, ll. 19-26).

30. **With respective to claim 17**, Donelly and Dasasathyan disclose the method as recited in claim 15. wherein in step h) the augmented network flow graph approximately models the presence and the movement of multi-row high cells along with single-row high cells (Dasasathyan, figure 7A-7B (--single-row--) and 9A-9C (-- multi-row--), col. 5, ll. 50-65 and col. 6, ll. 10-37).

31. **With respective to claim 18**, Donelly and Dasasathyan disclose the method as recited in step h) of claim 15, further comprising the steps of:

h1) solving the global augmented network model to include multi-row high cells (Dasasathyan, col. 6, ll. 38-45, col. 7, ll. 60-67 and col. 8, ll. 1-18).

h2) pre-placing multi-row high cells at a an initial location based on a global solution (Dasasathyan, figure 12A-12B, col. 8, ll. 27-32)

h3) executing steps (b) through (e) to legalize the single-row high cells (Dasasathyan, figure 7A-7B, and col. 5, ll. 50-65).

32. **With respective to claim 19**, Donelly and Dasasathyan disclose the method as recited in claim 15, wherein in step e1) the cost of cell movement in the general framework is computed by executing a method selected from the group consisting of: quadratic movement cost (-- quadratic programming--) (Donelly, col. 6, ll. 15-40), linear movement cost (Donelly, col. 5, ll. 66-67 and col. 6, ll. 15), linear wirelength change (-- minimum displacement --) (Donelly, col. 4, ll. 26-32).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nghia M. Doan whose telephone number is 571-272-5973. The examiner can normally be reached on 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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